

MAPPING PROJECTS ON AMELIORATING SOIL CONSTRAINTS, AND REVIEW OF SOIL CONSTRAINTS, PRODUCTS AND TECHNOLOGIES

KEY POINTS

- Identifying, understanding and managing soil constraints are major challenges to increasing agricultural productivity.
- A review of soil constraints in Australia highlighted the need for consistent national, regional and industry-wide mapping products for key soil constraints.
- Key priorities have been identified to overcome important soil constraints across a range of different industries and agricultural regions of Australia.
- Practical, economic, accessible and system-integrated amelioration strategies that target major constraints are more likely to be adopted than expensive novel and niche products.

THE CHALLENGE

In Australia, approximately 75% of agricultural soils have constraints that limit productivity. These soil constraints may be present in the surface of the profile, in the subsoil or often both. Producers face the challenge of identifying;

- which constraints are limiting production,
- where these constraints occur,
- the effectiveness of different strategies to improve productivity, and
- ways to economically improve or manage soil constraints particularly where there are multiple constraints.

THE OPPORTUNITY

The project team identified:

- locations and impacts of soil constraints, including mapping products and current and past research projects, and

- future research needs for soil improvement strategies and products for the Soil CRC to consider.

OUR RESEARCH

This study identified the major soil constraints to agriculture through analysing scientific literature and consulting with soil researchers, advisers and industry stakeholders. Expertise from across the spectrum of stakeholders including: practitioners, managers, technical experts and innovators was captured. Five methods were applied to capture, combine and analyse data including desktop reviews, mapping activities, technical working groups, and adviser and industry surveys.

Activities included undertaking a collaborative review to identify and map current research into soil amelioration products; holding a technical specialist workshop; conducting baseline adviser and industry surveys; studies of currently available maps of soil constraints to agricultural production and amelioration products and a needs assessment for Program 3 related to soil amelioration products and technology.



OUTPUTS

- Review and identification of soil constraints as determined by the scientific literature, soil researchers, advisers and industry stakeholders.
- Key considerations for evaluating the economic and environmental impacts of soil constraints, their management and research investment.
- The development of strong networks among government, research and industry.
- Recommendations for research areas.
- A baseline account of current soil constraint research including available mapping products, current research on soil amelioration strategies and products and identification of future research needs in this field.

Next Steps

There is still fundamental soil science research to be undertaken to better understand, map and develop metrics for monitoring and evaluating the impacts of soil constraints on agricultural production. Further research is suggested into key soil constraints which include: dispersive clays, alkalinity, acidity, salinity, poor/coarse/compacted soil structure, nutrient deficiency and declining organic carbon and problematic sandy soils.

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Project Reports/Publications

Orgill S., Antille D., Armstrong R., Bell R., Bolan N., Bush R., Cann M., Chen C., Clarendon S., Condon J., Davenport D., Dean G., Dunsford K., Esfandbod M., Friend J., Hackney B., Hancock G., Hardie M., Harper R., Hart F., Hart M., Hayes R., Henry D., Imhof M., Kidd D., Li F., Ma Q., Malcolm B., Bennett J.Mc., Mitchell R., Parsons D., Raine S., Rezaei Rashti M., Robinson N., Rose T., Singh B., Tavakkoli E., Tullberg J., Watt D., Whatmuff M. and Wilhelm N. (2018) *Mapping projects on ameliorating soil constraints, and review of soil constraints, products and technologies*. Final Project Report, Soil CRC.

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The CRC for High Performance Soils (Soil CRC) is bringing together scientists, industry and farmers to find practical solutions for Australia's underperforming soils. The CRC aims to enable farmers to increase their productivity and profitability by providing them with knowledge and tools to improve the performance of their soils. The Soil CRC is the biggest collaborative soil research effort in Australia's history. The Australian Government and the CRC's 39 participants collectively contribute \$164 million to the Soil CRC through both cash and in-kind contributions. The Soil CRC has funding until 2027.